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THE RELATIONSHIP BETWEEN MACROECONOMIC FACTORS AND PROFITABILITY OF REINSURANCE COMPANIES IN AFRICA: AN APPLICATION OF SYSTEM GMM-MODEL

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Abstract:

Despite the known strengths of the reinsurance companies to generate immense profits, evidence from existing literature indicates that the future of the reinsurance companies needs to be more robust to economic deficiencies leading to underperformance. There are many possible factors behind this. However, this study aimed to determine the relationship between macroeconomic factors and the profitability of African reinsurance companies with a Generalized Method of Moments (GMM) model. The study used 121 listed reinsurance companies from 48 African countries using secondary data from year 2008 to 2019. A 1452 observation panel data set was analyzed using conventional least squares and two-step System GMM estimators. The study revealed that GDP, interest rate, and the exchange rate positively impact profitability. In contrast, the inflation rate and money supply revealed a negative and negligible impact on profitability. The input of this research resides in providing new evidence on the macroeconomic factors influencing the profitability of listed reinsurance companies in Africa.

Keywords: System Generalized Method of Moments Estimators, Macroeconomic, Profitability, Reinsurance

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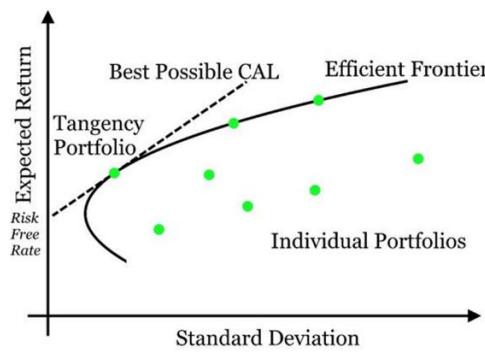
INTRODUCTION

The growth of every nation's economy relies heavily on the health of its financial institutions and the insurance industry, a critical financial institution that plays a significant role in advancing economic development (Olarewaju & Msomi, 2022). The insurance sector not only focuses on enhancing individuals' living standards by mitigating the risks they face; it also contributes to the flow of funds in the financial markets (Sognon, 2019). However, due to recent climate changes, there is an upsurge in the occurrence of financial risk in the reinsurance industry. For example, from a Swiss report, over 70% of the insured losses globally are from natural disasters caused by weather, destroying businesses, homes, and properties, which has led to increased claims by the insured. This led the insurers to require coverage from reinsurers in order to avoid insureds' hedged risks (Tegegn et al., 2020). As the burden is much on insurance companies, there is a massive rush for further covering by the reinsurance companies. In recent times, African reinsurance market profitability has been a strength. However, over 60% of reinsurance executives report reinsurers' profitability as low, propelled by declining rates, rising claims, and increasing costs. Hence, the importance of investigating the profitability of reinsurance companies must be considered. Apart from the study conducted by Sognon (2019) in South Africa and Ghana looking at the macroeconomic factors on the firm's profitability using the ROA as a measure of success, a considerable number of research studies that have been undertaken the African countries have not been used as compared to their counterpart industrialized nations. As a result, there is limited empirical data on the Influence of

macroeconomic factors on the firm's profitability in developing countries, including the African continent (Olarewaju & Msomi, 2022). Primarily, the reinsurance industry in the African continent is deemed significant for this study due to its distinctive environment and enormous development. There continues to be significant potential for growth even though there are barriers to entry to this industry due to stricter local regulations. Other odd operating conditions include turbulent oil prices, elevated inflation rates throughout most economies, increased competition, and local currency depreciation, among other serious obstacles (Sognon, 2019). Andoh and Yamoah (2021) state that profitability is still an essential goal of the reinsurance industry. It is clear from the worldwide studies that have been conducted that most studies incorporated both the microeconomic and macroeconomic elements to determine the effect of these factors on the profitability of the companies. As discussed earlier, most studies on the impact of microeconomic and macroeconomic factors on the profitability of reinsurance companies are from somewhere other than Africa. This has created a void in the research evidence, which is why it was necessary for this study's aim to determine the impact of macroeconomic factors on the profitability of reinsurance companies in Africa.

Profitability theories contend that businesses make profits as a reward for taking on risks. Running a business contains uncertainty and innumerable risks, such as market instability, rivalry, and operational challenges. Profitability rewards investors for the risks they undertake. Profitability theories offer a framework for understanding the fundamental ideologies and factors that contribute to a business's ability to make profits and guide it in making strategic decisions, cultivating efficiency, and improving its financial performance. Profitability theories accentuate the need for businesses to accomplish sustainable profitability over an extended period. This entails focusing on client satisfaction, building strong relations, and maintaining a favorable reputation. Sustainable profitability empowers businesses to reinvest in growth, woo investors, and endure market volatility (Panigrahi & Joshi, 2019). The present research has used the return on asset (ROA) as its profitability measure. Panigrahi and Vachhani (2021) ROA measures the efficiency of a company in generating profits from its total assets.

The assets of a reinsurance company can differ depending on its size, corporate strategy, and specific investment decisions. The joint assets that reinsurance companies may hold include cash and cash equivalents, investment securities, equities, real estate, loans and mortgages, derivatives, hedge funds, private equity funds, infrastructure projects, or commodities. ROA is calculated by dividing Net Income by Average Total Assets. The formula for calculating net income is Net income = Operating Revenues - Operating Expenses + Investment Income + Non-Operating Income - Non-Operating Expenses - Taxes. This study has used the Modern Portfolio Theory (MPT) as its theoretical framework. Markowitz is credited as being the originator of MPT in 1952. The goal of contemporary portfolio theory is to maximize predicted portfolio returns for a given degree of portfolio risk or to minimize the risk for a given level of return, and this is accomplished by carefully selecting the proportions of different assets.



Source: Suheyli (2015)

Figure 1. Modern Portfolio Theory

As shown in Figure 1, MPT emphasizes maximizing returns while avoiding risks and acknowledging systematic and nonsystematic hazards (Suheyli, 2015). This theory explains how investors should pick a portfolio to get the best possible return from a certain level of risk or the lowest possible risk for a predetermined level of return. A financial asset's level of risk and the anticipated return on that risk positively correlate with one another (Sadiye, 2014). MPT offers a comprehensive framework for understanding the dynamic relationships between systematic return and risk. According to the idea, the unsystematic risk, which may be caused by microeconomic characteristics unique to a particular company, can be reduced tremendously by investing in a diversified portfolio. Diversification is not a viable strategy for mitigating systematic risk caused mainly by the influence of macroeconomic variables. Because of this, it is possible to assert that the level of risk and return associated with a diversified portfolio depends on local and international economic and financial factors (Erdugan, 2012). Because reinsurance companies are considered investments in and of themselves, it is common practice for them to invest in a diversified portfolio. This allows them to limit their risk exposure while capitalizing on the potential returns of the many investment opportunities available. When selecting a portfolio, reinsurance companies should aim to maximize the value of future revenues or returns after considering the impact of discounts (or capitalization) (Suheyli, 2015).

The stability of an economy is improved when financial institutions, including the reinsurance sector, are profitable (Killins, 2020). The reinsurance and insurance industries are the key players in the global economy, and their contributions to the growth of economies in both developed and developing nations cannot be flouted. Firms make several strategic and operational determinations that are usually affected by the state of the economy. Apart from determinations, including financing, investing, and operation decisions, firms must pay attention to issues affecting their business sustainability (Morara & Sibindi, 2021). Among many other factors, the earlier empirical evidence shows that business sustainability must be measured in terms of macroeconomic indicators, such as variations in the currency rate and inflation rate, the consumer price index (CPI), government spending, and interest rates (Alali et al., 2018; Killins, 2020; Andoh & Yamoah, 2021).

Nevertheless, macroeconomic volatility in emerging nations is substantially greater than in advanced nations. For example, the African economy has seen currency, inflation, and interest volatility (Olarewaju & Msomi, 2022). These variables (i.e., macro) can either be positive or harmful to a company's profitability, depending on how they are combined. To a large extent, management has an influence over micro variables but not macro variables outside their sphere of influence (Andoh & Yamoah, 2021). The external variable management cannot influence the state of the macroeconomy. External or macroeconomic variables, such as changes in the economy, may have

an impact either directly or indirectly on a company's performance. The expansion of the economy, the rates at which different currencies may be exchanged, the amount of money in circulation, and inflation are all examples of macroeconomic variables.

According to Otambo (2016), interest is the cost of borrowing money from a financial institution or the fee charged for using someone else's property as collateral. Ndegwa (2017) defines the interest rate as the "price of money" representing market knowledge about the predicted change in the buying power of money or future inflation. Economists claim that interest rates are the cost of allocating capital over time. In contrast, monetarists see them as a crucial instrument for encouraging people to save more, with higher rates encouraging people to save and lower rates encouraging them to go elsewhere for better returns (Otambo, 2016). Because interest rates determine how much money is available in the economy. High-interest rates reduce inflation while economic growth is stunted. If interest rates are kept low for an extended period, the economy would be stimulated while inflation risks would rise (Olarewaju & Msomi, 2022). The following hypothesis has been developed on this. H0: Interest rate does not determine the profitability of reinsurers in Africa.

The term "inflation" describes an ongoing rise in the general level of prices within the economy. For businesses, moderate and low inflation rates are preferable since they encourage output and investment (Durguti, 2020). Inflation is a significant factor in reinsurance and has a detrimental impact on many parts of the reinsurance business, including payouts, technical considerations, and overhead. Claims payments and reserves for expected more significant claims rise with inflation, lowering technical results and profitability (Suheyli, 2015). The CPI tracks the average price movement of a representative bundle of goods and services consumers buy (Simiyu & Ngile, 2015). The following hypothesis has been developed on this. H0: The inflation rate does not determine the profitability of African reinsurers.

The exchange rate, commonly referred to as a forex rate or foreign exchange rate, is the price at which one currency will be traded for another (Andoh & Yamoah, 2021). The cost at which the money of one nation may be traded for the currency of another, according to the Business Dictionary. According to Nyirenda (2020), the exchange rate refers to the value of two currencies about one another. It is the exchange rate used to indicate the price of one currency in terms of another. The exchange rate is the cost associated with changing one currency into another. Either exchange rates are fixed, or they are fluctuating. The central banks of a nation set fixed exchange rates, while the market's supply and demand drive floating exchange rates (Andoh & Yamoah, 2021). Three different categories of foreign currency risk are presented to businesses: economic, transactional, and translational risk. While from a micro viewpoint, it impacts the performance of the companies, the foreign exchange rate impacts the nation's economy. Degradation of the domestic currency in terms of a foreign currency is known as exchange rate depreciation. In contrast, the gain of the local currency in terms of the foreign currency is known as exchange rate gain. Interest rates, the rate of inflation, the overall status of the economy, the trade balance, political stability, internal harmony, and the level of governance all affect exchange rates. According to Akkaş (2016), knowing the effects of foreign currency risk is essential for corporate valuation and risk management. According to the research by Barnor (2014), the exchange rate has a significant favorable impact on the stock market returns of listed companies in Africa. The following hypothesis has been developed on this. H0: The exchange rate does not determine the profitability of African reinsurers.

A nation's gross domestic product (GDP) is the total value, as measured in market terms, of all the products and services generated by the country at a specific time (Konchitchki & Patatoukas, 2014). It encompasses every final item and service, defined as those created by the economic agents in that nation regardless of who owns those economic agencies and that are not resold in any

capacity. According to Brynjolfsson and Collis (2019), the GDP is a macroeconomic metric most typically used to assess the entire economic activity inside a country; its growth rate represents the condition that the economy is about the business cycle. It is the primary indicator of both production and overall economic production, and it is used all around the globe. Households, enterprises, and the government are the three primary categories considered the "ultimate consumers" of products and services in economics. Sinha and Sharma (2016) also showed a positive association between profitability and GDP in India. Trujillo-Ponce (2013), on a sample of banks in Spain, revealed a positive influence of GDP growth on ROA. These findings are consistent with the findings of Sinha and Sharma (2016). The following hypothesis has been developed on this. H0: GDP does not determine the profitability of reinsurers in Africa.

A nation's entire quantity of money that is either in circulation or in existence is referred to as the money supply of that nation. The monetary base, the money supply M1, and the money supply M2 are the standard measurements of the money supply (Shrestha & Subedi, 2014). The term "money supply" may also be used to refer to the entire quantity of monetary assets that are accessible within an economy at a given point in time. Inflation (or the expectation of inflation) in the economy is caused by a rise in the money supply, which in turn causes an increase in the discount rate and a decrease in the returns on the stock market. When a high anticipated rate of return is used, the company's value will decline, which will lead to a reduction in the company's performance. According to Ndegwa (2017), the amount of money in circulation would have a significant bearing on the return on the stock market if and only if a shift in the rate of monetary expansion could alter the expectations of stock market players on the path of future monetary policy. When there is information on the rise in changes in the money supply, this will result in the monetary regulators' policies being more stringent in the future. The interest rate is among the most effective instruments for absorbing surplus money within the economy.

As a consequence of a rise in interest rates, the discount rate will increase, leading to a decrease in stock prices. One of the most effective tools is the discount rate. The fall in economic output will also negatively influence stock values, which the drop will compound. The amount of money in circulation (M3) was shown to have a strong relationship with the profitability of businesses in the reinsurance industry (Ndegwa, 2016; Macfubara et al., 2018). The following hypothesis has been developed on this. H0: Money supply does not determine the profitability of reinsurers in Africa.

METHODS

The years 2008 to 2019 were covered by the secondary data utilized in this research. The year 2008 was selected because, since the global financial crisis of that year, the African insurance industry has been under intense pressure. The macroeconomic data that was required came from the database of the world banks and international financial statistics. As a result, a significant portion of the data required for the research came from doing content analysis on the corporation's annual reports. This regional research and an imbalanced panel study lasted 12 years and included 1452 observations of 121 reinsurers from 35 different African nations. The use of panel studies was found to be appropriate and recommended due to its capacity to account for behavioral changes over periods, cross-sections, or both, as well as to control heterogeneity difficulties and for more excellent assessment of parameters (Hsiao, 2014; Omolade et al., 2019). The firms that were used were chosen on purpose because of the availability of data for the period under investigation.

Because of its capacity to account for issues including cross-sectional dependence, the two-step System GMM proposed by Blundell and Bond (1998) was selected as the estimation method. Arellano and Bond (1991) came up with the idea of using two estimators, one-step and two-step. It

was determined that a two-step estimator is superior in accuracy and productivity. In order to estimate the coefficients of the factors that determine the profitability of publicly traded reinsurance companies in Africa, a two-step version of the SYS-GMM statistical model was used. In addition, the serially correlated errors are accounted for by employing the Arellano and Bond 1 and 2 tests for autocorrelation in the idiosyncratic disturbance term, which are incorporated into the two-step GMM estimator. These tests are used to determine whether or not the errors are strongly linked with one another. In addition, the Hansen or Sargan test, which is the test that is used to assess the validity of the instrument, is employed to justify the reliability of the estimate that was performed in this research.

RESULT AND DISCUSSION

Model Specification. The external factors affecting African reinsurance companies' profitability are depicted using the below expression. The linear relationship between dependent and independent variables is shown as $Y_{it} = \alpha + \beta'X'_{it} + \mu_{it}$. Based on the fact that there is one category of determinant, which is macro-economic, the model will lead to $Y_{it} = \alpha_0 + \beta_i X_{Ait} + \mu_{it}$. Where X_{Ait} denotes macroeconomic variables. Explicitly, $Y_{it} = \alpha_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \mu_{it}$. Where X_{Ait} is represented as $X_1 - X_5$. The dynamic panel model of the determinants of profitability of the African reinsurance sector is stated below: $Y_{it} = \beta_1 X_{1it-1} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \mu_{it}$.

Where Y_{it} is the dependent variable, X_{1it-1} denotes the lagged performance measure, which signifies the dynamic dimension of the model. The study used the return on assets (ROA) as the dependent variable (Y) to measure profitability. $X_2 - X_6$ is the independent variable (macroeconomic)? The independent variables were chosen based on previous studies such as Lalon and Das (2022), Ben Dhiab (2021), and Olarewaju and Msomi (2021). α_0 is the intercept, $\beta_1 - \beta_6$ is the coefficient, and μ_{it} is the error term; it denotes it is a panel study. The variables used in this study are explicitly defined as shown in table 1 below:

Table 1. Variable definition and measurement

Definition	Notation	Formula	A priori
Return on Assets	Y	Profit After Tax/Total Asset	
Lagged Return on Assets	X_1 / ROA_{t-1}		+
Gross domestic product (GDP)	X_2 / GDP		+
Interest rate	X_3 / INT		+/-
Exchange rate	X_3 / EXR	Countries rate to USD	+
Inflation rate	X_4 / INF	CPI	-
Money supply	X_6 / MOS	M3	+

The model to be estimated in this study is stated as $ROA_{it} = \beta_1 ROA_{1it-1} + \beta_2 GDP_{2it} + \beta_3 INT_{3it} + \beta_4 EXR_{4it} + \beta_5 INF_{5it} + \beta_6 MOS_{6it} + \mu_{it}$.

Table 2. Descriptive Statistics

Variable	Observation	Mean	Std. Deviation	Minimum	Maximum
ROA	1,437	0.0228178	0.0524069	-0.317531	0.4461032
INT	1,121	18.25703	12.09157	4	65.4175
INF	1,404	284.7941	285.0299	0.92353	926.7605
GDP	1,368	29.70056	58.77085	0.19	568.5
EXR	815	33.98836	65.77404	0.4456431	58.6

MOS	1,322	3.603197	1.27789	1.114778	7.994872
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Table 2 shows the descriptive result of the determinants of profitability for the African reinsurance companies. ROA measured profitability, and the determinants examined are macroeconomic. The number of observations reveals that the panel is unbalanced as none of the variables have up to 1452, as expected. The results reveal average values of 0.0228178, 18.25703, 284.7941, 29.70056, 33.98836, and 3.603197 for ROA, interest rate, inflation rates, GDP, exchange rate, and money supply, respectively. The values of standard deviation are 0.0524069, 12.09157, 285.0299, 58.77085, 65.77404, and 1.27789 for variables ROA, interest rate, inflation rates, GDP, exchange rate, and money supply, respectively. This shows the rate of deviations of the variables from the expected ratios. The minimum and maximum values are -0.317531 and 1.823402; 4 and 65.4175; 0.92353 and 926.7605; 0.19 and 5.68.5; 0.4456431 and 58.6; 1.114778 and 7.994872 for ROA, interest rate, inflation rates, GDP, exchange rate, and money supply respectively.

Table 3. Correlational analysis

	ROA	INT	INF	GDP	EXR	MO3
ROA	1.000					
INT	-0.004***	1.000				
INF	-0.087***	0.5622	1.000			
GDP	0.083***	0.0731	-0.023***	1.000		
EXR	0.027	-0.1029	0.129	0.005	1.000	
MOS	0.016	0.3471	0.250	0.113	-0.155	1.000

***, **, and * mean significance levels at 1, 5, and 10 percent significant levels

The correlation coefficients presented in Table 3 show the degree of relationship that exists between macroeconomic factors and the profitability of reinsurance companies in Africa. From the result, it is established that the interest and inflation rates are inversely correlated with ROA to the tune of -0.004 and -0.087, respectively. On the other hand, exchange rate and money supply are positively correlated with ROA to the tune of 0.083, 0.027, and 0.016, respectively, having exchange rate and money supply insignificant. None of the correlation coefficients is near the 0.8 threshold, indicating no signal of multicollinearity among the variables examined in this study.

Table 4. Regression Analysis: OLS and Two-step SYS-GMM

VARIABLE	Two-step SYS-GMM		POOLED OLS		Decision on Null Hypotheses based on two-step SYS-GMM
	COEFF	STD ERR	COEFF	STD ERR	
ROAL1	0.4172599	0.1332178(3.13)***			Reject
INT	0.0000529	0.0001556(0.34)	-0.0001171	0.0002311(-0.51)	Accept
INF	-2.60e-06	6.43e-06(-0.40)	-1.67e-06	0.0000145(-0.12)	Accept
GDP	0.0000429	0.0000224(1.92)*	0.0000614	0.0000419(1.47)	Reject
EXR	9.85e-06	0.0000116(0.85)	0.000013	0.0000459(0.28)	Accept
MOS	-0.0001031	0.0010702(-0.10)	0.0002718	0.0023512(0.12)	Accept
Constant	0.0000769	0.0000302(2.55)***	0.022397	0.0121414(1.84)*	
No of observation		1169			1141
No of Group		121			

No of instrument	93
Wald chi2(14)	712.20(0.000)***
Hansen test	Prob > chi2 = 0.847
Sargan Test	Prob > chi2 = 0.000***
AR 1	Pr > z = 0.000***
AR 2	Pr > z = 0.535
Prob > F	F(14,1141) = 13.25; corr(u_i, Xb) = -0.4174 0.0000***
Adj. R ²	76%

***, ** and * means significance level at 1%, 5% and 10% significant levels.

This paper has focused on the two-step SYS-GMM estimator due to a number of its benefits, including the following (Wu et al., 2022):

- It controls for time-invariant company-specific effects;
- It deals with the endogeneity problem of the lagged dependent variable;
- It allows for some endogeneity in the other regressors and
- It optimally combines information on cross-company variation in levels with within-company variation.

The dynamic character of the model was confirmed by the finding that Lagged ROA has a positive and substantial effect on ROA using the two-stage SYS-GMM. A Z-statistic of $3.13 > 2.58$ indicates a direct and substantial effect of profitability from the 'a Prior' year on profitability from the current year for reinsurance businesses at the 1% level. Cabarcas Mercado and Rodado Roa (2017) and Otambo (2015) found similar results.

The GDP growth rate in the domestic product has a similarly substantial effect on the profitability of the analyzed insurers. There is a strong correlation between GDP, the primary worldwide measure of production and economic activity, and the profitability of African reinsurers. This result agrees with those of the Indian researchers Sinha and Sharma (2016) and the Spanish researchers Trujillo-Ponce (2013) and Moreno, Parrado-Martínez and Trujillo-Ponce (2020).

Both the interest and currency rates positively affect profitability, but only slightly. This suggests that the positive effect of these macroeconomic drivers on the profitability of the African reinsurers is minimal. In contrast to the interest rate, which contradicts the 'a Prior' assumption, the exchange rate tracks the 'a priori' forecast. Higher interest rates are predicted to hurt profitability because they would restrict sector liquidity, which will dampen investment and overall business activity (Kusumaningtyas et al., 2021; Kalsoom et al., 2016; Olarewaju & Msomi, 2022).

Other macroeconomic variables, such as inflation rate and money supply, also have a negative and negligible impact on profitability. The inflation rate's negative impact confirms the 'a Prior' anticipation, but the money supply's positive impact contradicts it. Claims payments rise sharply at times of rising inflation, often resulting in dwindling profitability. Insurers also anticipate a positive impact from an increase in money supply, which includes both currency and deposit liabilities. Since money supply has no appreciable effect on economic output, Ndegwa's (2016) and Bello and Saulawa's (2013) conclusions are invalid.

Since the number of instruments (93) is smaller than the number of groups (121) in this study, the results of this two-stage SYS-GMM may be trusted, even if the total number of observations (11669) indicates that the panel is not evenly distributed. The 0.847 probability result from the Hansen J statistic test further demonstrates the accuracy of the stated instruments. It suggests that the SYS-GMM can avoid any instances of over-identification of its instruments. Hansen J test is

sufficient to verify the dependability of the instrument provided in SYS-GMM, as stated by Roodman (2009) and Olarewaju and Msomi (2022). For the first and second orders of the Arrelano-Bond serial correlation, the corresponding probabilities are 0.000 and 0.535, respectively. This demonstrates that the supplied model does not have any serial correlation.

CONCLUSION

This research paper investigated the macroeconomic factors determining African reinsurance firms' profitability. In particular, from 2008 to 2019, data from 121 reinsurance firms that were publicly listed across 48 African nations were utilized. The two-step System Generalized Method of Moments findings revealed that the significant determinants of profitability of the African reinsurance companies, covering the ROA, GDP, interest rate, and exchange rate, all positively impact profitability. In contrast, the inflation rate and money supply have a negative and negligible impact on profitability. From these results, the research suggests that steps should be taken by the government, namely via the line ministries of finance and planning, to guarantee that the economy is operating effectively. The government should be worried about the current inflation rate due to its negative influence on capacity utilization. The government should strive to maintain a stable exchange rate to enable firms to secure the necessary resources from foreign countries. Government and regulatory authorities should sustain efforts to ensure a sustainable GDP. The absence of some data makes it impossible to have an evenly balanced panel, which is a limitation of this research.

Even with this, the significance of the results remains. As a recommendation, further research studies of this nature need to be done, but this time, utilizing the life insurance industry as a case study. Other microeconomic elements, which were not considered in the present study, will also have to be considered as they may affect the reinsurance company's profitability.

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